



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## THE PROBLEM OF SPACE IN JEWISH MEDIAEVAL PHILOSOPHY

BY ISRAEL ISAAC EFROS, Lynn, Mass.

I TRUST that the term 'Jewish Philosophy' does not require any apology; indeed, I should owe the reader a greater apology were I to attempt to give any. The famous or infamous indictment of Renan<sup>1</sup> that the Jews are destitute of any philosophic talent is best refuted by expository works which bring to light the depths of Jewish thought. The refutation was begun by Solomon Munk, and is still continued by every monograph that has appeared on the subject. As far as the problem of space is concerned, a problem that has baffled human thought ever since the days of Zeno of Elea, I hope that the subsequent pages will serve as a testimony of Jewish profoundness of thought and Jewish comprehensiveness of the grave antinomies that this difficult problem presents.

The scope of this work is limited, as the title indicates, to Mediaeval Jewish Philosophy, i.e. to that epoch in Jewish thought which was inaugurated by Isaac Israeli of Kairwan, an older contemporary of Saadya, and culminated in Don Isaac Abrabanel—a period of five centuries least familiar to the general student of philosophy, but which produced the choicest fruits of the maturing Jewish intellect. I am aware of the abundance of ideas relative to the problem of space which are harboured in the

<sup>1</sup> See his *Histoire des langues sémitiques*, I, 1.

Talmudic and Midrashic literature ; but their influence on the philosophy of the period under discussion is, as far as our problem is concerned, of no great importance, and is therefore omitted. For a similar reason I shall not deal here with Philo's views on space,<sup>2</sup> or, on the other side, with the views of Spinoza and others, especially our great contemporaries Hermann Cohen and Henri Bergson. Nevertheless, should the reader resent the limitations that the term 'Mediaeval' imposes, I shall attempt some day to resume the discussion and deal with those views that are here out of place.

#### INTRODUCTION.

I. On the surface, the idea of space is comparatively simple and intelligible. It is the idea of extensity of things, the idea of an external world that is not a mere pin-point, all the parts of which being coalesced and compressed to form a non-magnitudinal and indivisible unity, but stretched out and extended around us, all the parts of which are lying *side by side* of one another, and thus capable of being measured. We perceive this extensity of things and the 'alongsidedness' of its parts, by our visual and tactual and muscular senses. When we move our eye to circumspect a landscape, we have a sense of its range or extensiveness. When we lay our hand over this desk, we have a sense of a greater area than when we lay our hand over a pin-point. And when we furthermore move our hand so as to describe a circle, we feel a vastness around us. And now when we gather our perceptions of extended objects, and employ the method of generalization and abstraction, we arrive at

<sup>2</sup> As for Philo's views on space, the reader may find something in Leisegang's *Die Raumtheorie im späteren Platonismus* (Weida i. Th. : Thomas & Hubert, 1911), but the account is by no means satisfactory.

the concept of extensity occupied or not occupied by concrete objects—the concept of pure space.

Yet when we come to analyse this common conception of space we find ourselves beset with puzzling problems and baffling antinomies. The notion of space, I said, lies in the alongsidedness of parts. But those parts themselves in order to be perceived must be composed of smaller parts, and so on; since the perception of any extended quantity involves a perception of parts. But what of the tiniest speck, the *minimum sensible*, in which no parts seem to be present; how is it possibly perceived? And if that is true, every body is composed of an infinite number of particles, or, in other words, every finite object around us, from the mountain height to the grain of sand, is really infinite. Thus an ant moving over a blade of grass is moving over an infinite, and when you have moved over from one corner of the room to the other, you have completed an infinite series of points. All of which is absurd.

Leaving the question whether space is infinite in division, we may ask whether space is infinite in extent. We conceive a thing when we know it or seem to know it definitely, while infinity carries with it an indefinite and indeterminate element, which admits of no conception. A definite knowledge of a thing implies the ability to compare it to others and distinguish it from others. But the infinite is incomparable and indistinguishable. Yet, on the other hand, if space is finite and bounded, the question is: By what is it bounded? What is beyond its boundary? And what if a thing were to be carried beyond the realm of space; would it shrink into nothingness?

One more question: Is space itself material or immaterial? It could not be material, for a thing could not

occupy another unyielding material thing without violating the law of impenetrability. If immaterial, what is it? What is meant by an immaterial something existing in the external world? Perhaps it is not an external reality. Perhaps it is a mere mental illusion, one of those illusions with which the mind is wont to deceive mankind. But is it conceivable that the objective reality is unspatial, that it has no magnitude whatsoever, that this vast universe with its stars and planets is really a mere geometrical point located nowhere except in the mind of the mathematician? If space is an illusion, why cannot the elephant escape through the key-hole? To make space mental does not make matters more conceivable.

Such are the difficulties which present themselves in connexion with the notion of space. The deeper the mind delves into the problem, the greater the tangle. It is one of the sphinxes in the deserts of thought. From the dawn of speculation we find space to be one of the most prominent objects of investigation; Zeno, Plato, and Aristotle bent their great intellects on the solution of space; colossal systems of science were reared on the notion of space. Yet the meaning of space has remained a mystery till the present day. Indeed, the difficulties seem to increase with the time.

It would be preposterous of course to claim that the Jews were cognizant of all these difficulties that the modern era has introduced. If we turn to examine the views on space maintained by the two greatest of Greek thinkers, who had such an enormous influence on Jewish thought, we will get a notion of the type of problems that we will have to deal with in the following chapters. In addition, it will present us the sources and the starting-point for the views that are to be discussed in this study.

## PLATO'S CONCEPTION OF SPACE.

II. Students of Plato are not in agreement as to his view on space. Some maintain that in Plato's conception space is the *primaeval* matter, the original substrate which was fashioned by the Demiurgus into all perceptible objects, that it is the raw material out of which the great artisan created all things. In support of this interpretation they fall back upon Aristotle, who in his *Physics*, IV, 4 remarks as follows: 'Hence also Plato in the *Timaeus* says that matter and a receptacle are the same thing. For that which is capable of receiving and a receptacle are the same thing.' Thus Aristotle makes Plato—and who would understand Plato better than his illustrious disciple?—identify space with matter, pre-existing and receiving all created things. Hence also all mediaeval philosophers unanimously assumed that Plato affirmed the eternity of matter. On the other hand, there are many scholars who claim that Aristotle misunderstood Plato, and that according to the latter space and matter are not identical, but two distinct and separate beings.<sup>3</sup>

Now, in favour of the former view, the following arguments are generally adduced. Plato speaking about the third *γένος*, the abiding substrate in the incessant mutation of phenomena, compares it to the gold that is moulded into all sorts of figures, to the wax that is impressed by the seal.<sup>4</sup> The elements, fire, air, water, earth, are not four varieties of Being, four different essences, but mere states or modes of one sensuous mass. 'Fire is that part of her nature which from time to time is inflamed, and

<sup>3</sup> For a detailed bibliography of the two views, see Zeller's *Plato and the Older Academy*, ch. VII, notes 18, 20, and also his *Platonische Studien*, 212, 222.

<sup>4</sup> *Tim.*, p. 50.

water that which is moistened, and that the molten substance becomes earth and air in so far as she receives the impressions.'<sup>5</sup> Evidently Plato had in mind a sensuous ground-work of all existence. Besides, it would be inconceivable to reduce all things to an incorporeal essence or mere space. Plato, it is true, characterizes the four elements according to geometrical solids consisting of nothing but triangular surfaces.<sup>6</sup> Zeller points out this latter Platonic theory as a decisive proof against the theory of corporeal primary matter.<sup>7</sup> But when Plato maintained that 'every solid must necessarily be contained in planes', he did not mean that they are *composed* of planes and nothing else. He did not mean to reduce this solid world to an empty geometrical structure, to a mere house of cards. A thousand planes do not make an actual solid. But it seems that Zeller here lost the thread of Plato's argument. Up to the middle of p. 53 Plato was discussing the three-fold classification of Being, and particularly the material substrate of all things, that indeterminate mass existing before the creation, in which 'fire and water and earth and air had only certain faint traces of themselves, and were altogether such as everything might be expected to be in the absence of God'.<sup>8</sup> And now Plato commences a description of the process of creation proper, the process of formation of the universe. I mean, putting form to the primordial chaotic matter and unfolding its dormant elements.<sup>9</sup> And it is here in the discussion of the formal

<sup>5</sup> *Tim.*, p. 51.

<sup>6</sup> *Ibid.*, p. 54.

<sup>7</sup> Zeller, *Plato and the Older Academy*, VII.

<sup>8</sup> *Tim.* 51.

<sup>9</sup> Νῦν δ' οὖν τὴν διάταξιν αὐτῶν ἐπιχειρητέον ἐκάστων καὶ γένεσιν ἀήθει λόγῳ πρὸς ὑμᾶς δηλοῦν, *Tim.* 53 b. The word *diataxis* Jowett translated by 'disposition', which may suggest that Plato sets out to discuss the essence

aspect of the universe that the description of the geometrical figures comes. Thus, things were not *made of* but *according to* plans, surfaces, and space is not the material but the formal cause of all things.<sup>10</sup>

To come back to our main discussion, another argument might be presented in favour of the materialistic view of space. In describing the primordial receptacle, the matter of generation, he remarks 'that if the model is to take every variety of forms, then the matter in which the model is fashioned when duly prepared, must be formless, and the forms must come from without' (*Tim.*, p. 50). Now it is conceived that Plato believed in the primordial existence of an absolutely formless mass which was informed from without like the wax by the seal. The modern man can hardly conceive matter and form being separate: this is because his accumulated experience leads him to be cautious in forming his cognitions, and not to attempt to leap over the circle of phenomena. The ancients, on the other hand, were inexperienced, youthful, rash, and ready to objectify and hypostasize any idea that presented itself to their premature minds. It is only the particularistic view of mankind, i.e. the view of man as separate

of things, but a more faithful rendering is 'arrangement', which fits better with the line of argument.

<sup>10</sup> Indeed it is highly probable that even the Pythagoreans, who held that number is the principle of all things, did not hypostasize it, did not consider it the essence and substance of things, but rather their formal element. Aristotle, in his *Metaph.*, I, 2, 5; XIV, 3 asserts that the Pythagoreans considered numbers to be things: and in *Metaph.*, I, 6 he remarks that they are prototypes of things. Zeller (see his *Greek Philosophy to the time of Socrates*, I, p. 369) lays stress on the first statement, and explains that they are also prototypes in the sense of law, but many other students of ancient philosophy support the latter statement of Aristotle to the exclusion of the former. See Ritter, *Geschichte der alten Philosophie*, IV, ch. 2.



individuals, that makes Socrates and Plato ancient ; a truer view is the general and evolutionary one which considers John Locke and Immanuel Kant as ancient, and Socrates and Plato as youths wantoning with abstractions and mere ideas. Plato particularly had that tendency to objectify and to hypostasize logical realities. One can therefore easily grasp Plato's assumption of the coalescing of two independent elemental realities, form and matter thus producing all things. But one cannot conceive how Plato would make empty space as the universal substratum and at the same time insist that the form should come from without. For if form here means anything, it means certain limitations of magnitude. This body has a cubical form, another spherical and still another oval. But magnitude means extension, and to speak of formless space is to speak of an unextended space or of a non-spatial space, which is absurd.<sup>11</sup> And it is equally absurd to insist on having the form come from without, for by definition form can come from space only.<sup>12</sup>

So much for the corporealistic view of Plato's conception of space. On the other hand, Plato also speaks of space in a manner that entirely excludes all notions of corporeality. He defines it in the *Tim.* 52 as the 'home for all created things'. By 'created things' one naturally understands concrete objects composed of matter and form ; and Plato

<sup>11</sup> It is impossible to evade the argument by reading into Plato Aristotle's definition of form, λόγος τῆς οὐσίας. The analogies that Plato finds to Form in the seal impress on the wax and in the transient shapes of the gold, obviate such an interpretation.

<sup>12</sup> Perhaps a similar objection can be raised against formless matter, but we must not forget that the doctrine that extension constitutes the very essence of material things was not yet fully realized in the days of Plato. The atomists, for example, believed in material atoms which were at the same time invisible.

defines space as outside of them, as their home. Space then, according to Plato, must be immaterial. Furthermore, he maintains that this third nature 'is eternal, and admits not of destruction' (p. 52). Now in p. 28 he had laid down a rule that 'that which is apprehended by intelligence and reason is always in the same state; but that which is conceived by opinion, with the help of sensation, and without reason, is always in a process of becoming and perishing, and never really is'. In other words, things material are destructible, and things spiritual are eternal; and since space is according to Plato eternal, it cannot be corporeal.

These are the two views of the Platonic conception of space, but it seems to me that either of these two views attaches itself to one particular passage in the *Timaeus*, and does not do full justice to the argument as a whole. It seems to me that the adherent of either view tears passages out of their context, and hence arrives at such contradictory results. Hence it is of paramount importance to analyse very carefully the whole development of the argument. But first let me point out a curious and suspicious contradiction in Plato. First, it is to be noticed that from p. 49 to p. 52, where he introduced this third *γένος*, this 'receptacle, the matter of generation', and where he discusses it rather in detail, he does not mention even once the word space or its equivalent (χώρα, τόπος), but in p. 52 he introduces again a third *γένος*, and there he refers constantly to space and no longer to any 'receptacle'. Is it not curious? On further inspection, the matter becomes more interesting. In p. 52 he describes space as eternal, indestructible, 'perceived without the help of sense, by a kind of spurious reason'. Now turn

to pp. 49-52, and here he never mentions that the receptacle is eternal. True, it is spoken of as 'always the same', but the expression seems to have a rather relative value. It is always the same while the images and the forms that it assumes are coming and going, transient, brief, and fleeting. It is the abiding groundwork of all transitory things. Yet he does not say that it is in itself, absolutely speaking, eternal and indestructible. Thus it is strange that the attribute of eternity, so emphatically stated with reference to space (p. 52), is entirely overlooked in the case of the receptacle (pp. 49-52).

The second characteristic of space, that it is perceived without the help of sense, by a kind of spurious reason, in a dreamlike manner, is also not clearly stated in the case of the receptacle. He describes it as 'an invisible and formless being', and is 'most comprehensible' (p. 51), and he maintains that it is known through a consideration of the fleeting images. The meaning then is clear. We cannot perceive the receptacle, for it is formless. When I direct my gaze at the tree, I do not see the thing in itself, I see the form of the tree. Only its externality is revealed to my senses. Sensation then has to do with the forms of objects, not with the objects *per se*. Hence one may naturally expect that the receptacle which is formless should not be perceptible. How then is the thing known? The answer is: the sensation of the transitory and fleeting object leads the mind to assume an abiding groundwork, a receptacle. Hence the latter is known empirically, and, strictly speaking, adhering to the Platonic terminology, we have no knowledge of space but 'right opinion', for every empirical cognition is a mere opinion. And yet, in p. 52, Plato maintains that space is

known by reason, though a spurious one, and that it is not at all an empirical concept.<sup>13</sup>

Thus the whole matter is very puzzling. Is Plato contradicting himself in such close juxtaposition, or is the receptacle one thing and space another? If we now proceed to a general analysis of Plato's argument in the *Timaeus*, I think the puzzle will be solved.

After an invocation of the gods, Timaeus, the natural philosopher, begins the story of creation. There are two natures in the universe, Being and Becoming, the permanent and the mutable, the eternal and the destructible. Everything that was created has had a design and realizes a purpose. This idea is fully amplified and elaborated in some detail. But this represents only one view of creation, namely, that of the creator. And so at the end of p. 47 he remarks: 'Thus far in what we have been saying, with small exception, the works of intelligence have been set forth; and now we must place by the side of them the things done from necessity, for the creation is mixed and is the result of a union of necessity and mind.' If by the mind (*νοῦς*) Plato understands the rational, and the forming element, then by necessity (*ἀνάγκη*) he understands the irrational or the plastic element in creation. By *ἀνάγκη* thus is meant the *motum non movens*, that which receives the free and spontaneous activity of the *νοῦς*, the mould or the raw material of creation. Thus after Timaeus invokes the gods anew, he remarks: 'This new beginning of our discussion requires a fuller division than the former.' Notice that all he claims to do here is not to *add a new nature of being*, a new genus overlooked in the previous

<sup>13</sup> On the meaning of the 'Spurious reason' see Zeller's *Plato and the Older Academy*, VII, note 60.

discussion, but simply to give a fuller division. For the genus of Becoming, before assumed to be simple, since the situation did not demand any further analysis, is now to be divided into its constituents for the purpose of bringing out the principle of *ἀνάγκη* in the universe. Heraclitus declared *πάντα ῥεῖ*, and Plato subscribes to that doctrine. Yet it needs some modification. True that the shape of the gold moulded by the goldsmith is mutable and transitory, yet behind there is abiding gold that one can point his finger to and say *τοῦτο*. Hence a thing of Becoming is not after all unique and simple, but behind the fleeting forms there is a more abiding substrate. Becoming, then, can be further classified into the two incoordinate elements, form and matter, and the latter is the principle of necessity, the invisible receptacle and nurse of generation.

But here (p. 51) an epistemological problem presented itself before Plato, and he digresses for a little while. If we see only forms and phenomena, what right have we to think of things in themselves, of Ideas? And how do we know that our mental representations have their corresponding objects in reality? A similar question might be asked: How do we know the nature of the invisible raw material? But here the answer is simple—empirically, by means of our senses. Fleeting images must have their more abiding receptacle. But by what channel do we cognize Being, the Ideas that are not perceptible to our sense? This involves Plato's whole theory of knowledge. There are two different kinds of cognition—mind and true opinion, the former seeing things *a priori*, without the aid of the senses, and the latter knowing things *a posteriori*, by experience. In correspondence to these two ways of knowledge we have the realm of Being perceived by mind, and

the realm of Becoming, including both forms and matter apprehended by true opinion, which knows both the image and the thing. But this twofold classification does not exhaust all human cognitions. It does not include that dream-like knowledge, that mysterious, inexplicable 'spurious reason' which apprehends of a home of all created things, eternal and indestructible. It might be omitted in the story of the creation, for it neither plays the creative part of Being, nor is it the plastic element of Becoming, but stands alone in its eternity as the home of all created things, nay, as the stage upon which the whole drama of creation is performed, and the stage never enters into the plot of the drama; yet it cannot be overlooked as an object of cognition in the epistemological discussion. Hence Plato introduces here a correspondence to our third mode of apprehension, a new genus, 'a third nature, which is space'. After a few remarks on the nature of space, Plato returns (p. 53) to the story of creation, and having discussed the material essence of things, the universal chaotic mass, he now proceeds to tell how Demiurgus produced order and arrangement in the world, and the discussion of the material cause gives way to the formal cause in the generation of the universe.

Thus our problem is solved. It was a misunderstanding that led people to believe that in the description of the receptacle and of space Plato referred to one and the same thing. We have shown that on the contrary Plato conceived them to be two distinct natures; the one partaking in creation, the other containing creation; the one empirically apprehended, and the other independent of all sensations. And all the arguments that the supporters of the materialistic view of space endeavoured to draw from Plato's discussion

of the receptacle, the matter of generation, are based on a misunderstanding.

What then are we to gather from Plato's genuine discussion of space? It is not material, for all material things are created and empirically given, while (p. 28) space is eternal, and beyond all experience. We derive the notion of space not from contact with external reality, as the father of English empiricism claimed, but it is an innate idea of the mind, that all created things must be in space. Psychologically, this view bears a striking resemblance to the Kantian conception of space, but metaphysically the two are diametrically opposed to each other. Indeed, according to Plato, space is not a mere *ens rationis*, for being eternal it existed ever before the birth of the human mind.

When we come down from Plato to his illustrious disciple, Aristotle, we feel somewhat relieved. To be sure the matter becomes more profound, the treatment more analytic, and we have now before us a procession of brilliant syllogisms, but the most profound syllogism may sometimes be more easily digestible by the human mind than the smallest figure of speech.

#### ARISTOTLE'S CONCEPTION OF SPACE.

III. That place<sup>13a</sup> exists is evident from our most ordinary experiments. Watch a vessel through which water flows out and air comes in. There has been a thorough change in the contents of the vessel, yet something remained unchanged, the stereometric content, the place, the cubic inch or cubic foot which does not change whether it

<sup>13a</sup> It is to be noted at the outset that our usual distinction between 'place' and 'space' does not exist for Aristotle. They are both identical.

contains air or water or any other material. Thus place evidently exists. And it has not only mere existence, but also different qualitative determination, namely, upward and downward; fire tends upward, and earth downward (Aristotle's *Acht Bücher Physik*, Prantl, IV, ch. 1). But what is the essence of space? Here a multitude of difficulties present themselves. We all know, of course, that it is characterized by three dimensions. But in what category is place to be put? It cannot be matter, for in that case we could not have a body in space without violating the law of impenetrability, according to which two bodies cannot occupy the same place at the same time. For if a body could absorb another equal body, it might go on with this process of absorption to such an extent that a drop of water might absorb the whole sea (IV, 8). Place then cannot be material, for then it could not form the receptacle for any material thing. On the other hand, it cannot be incorporeal for it has magnitude. Or is it perhaps the limits or the superficies of any body? Resuming our original experiment with the vessel, we find that while the superficies of water make way for the superficies of air, and these in turn make way for some other superficies, what we call space does not change, hence space cannot mean superficies.

Thus we have seen that space is neither matter, nor form, i. e. the superficies of matter. Indeed, matter and form are internal in any given body, while by space we commonly understand an external receptacle. For the same reason we cannot maintain that space is the interval between the superficies of an object; for an object may be taken out of its place and restored to it, but one cannot remove an object from its interval. Moreover, the identi-



fication of space with the interval of a thing will lead us into many absurdities.

In the first place, if by space we understand the interval pervading the water or the air passing through the vessel, then every particle of the moving body will be surrounded by a space, and consequently there will be an infinite number of spaces.

Secondly, a moving body moves in *space*, but the body contains in itself a space in the form of an interval. Hence space will move in space, which is absurd.

Thirdly, when the vessel which contains an interval moves and occupies another interval, we will have a fusion of two intervals or spaces, which is likewise absurd.

But if space is neither matter nor form, nor the interval of a thing, there remains only one more alternative, and that is the adjacent boundary of the containing body. Man, we say, is in the world by virtue of his being on the earth, and on the earth because of the limited area which closely comprises him. Thus by space we must understand nothing else than that which contains, i. e. the vessel of any given thing. The place of the sailor is in the boat, the boat is in the river, and the river is in the river-bed. But Aristotle is anxious to make of space an ultimate being, and hence maintains that strictly speaking space is not the boat, nor the river, for these are movable, and a movable space would signify a space moving in space, which is absurd. True space then is immovable. It is the extreme limit of the heavenly sphere in which all things move, but it is not itself moved. Consequently only that is essentially in space which is contiguously contained in that extreme immovable boundary. All other things are only accidentally so by virtue of their being

a part of that which is essentially in space, just as we say, reason is in man, though strictly speaking it is only in the mind of man.

So far we have been discussing space as filled by this or that object, as *πλέον*, but there are some who believe in the existence of a *κενόν*, of pure and empty space unoccupied by any material being, whether earth, water, or air, a mere void, an absolute vacuum. And they support their belief with the following arguments. Motion is possible only through a vacuum; for if a body could move through and penetrate another body, a sea, as we have seen before, might be absorbed in a drop of water. And how could any absorbent material soak into itself any liquid without exhibiting any voluminous increase, if not for the intervening voids? Aristotle repudiates the existence of any vacuum. Attacking the argument from motion, he maintains that motion is rendered possible, not necessarily through a vacuum, but also through an exchange of places with another body. Similarly when an absorbent body attracts a liquid, it may not be because of inherent voids, but because it dispels another body, namely, air. Furthermore, the fact is that vacuum, far from helping a moving body, far from forming the *sine qua non* of motion, makes indeed the phenomenon of a moving body impossible. Let us first analyse the kinds of motion. There is a motion of fire upward, or of earth downward, i. e. natural motion; and there is a motion of the ball that has been cast, i. e. violent motion. Both kinds of motion are impossible, according to Aristotle, in a void.

The upward tendency of fire is possible only through the difference in the conditions of the place in which it tends, from the conditions of place to which it tends, but

a void cannot have these differences, inasmuch as it is the privation of any properties or conditions. Hence natural motion in a vacuum is an impossibility.

Violent motion is similarly impossible in a void. For the projected ball, according to Aristotle, moves on by the impulse of the air behind, which being lighter tends to move faster than the ball; but in a void there is no air to keep the ball in motion. Furthermore, the velocity of any given body depends on the density of the medium and the weight of the body. All other things being equal, the rarer the medium, the quicker the velocity; the less the density of a medium, the less the time that it will take a body to move over a given space. And since the density of a vacuum is zero, the time in which a body undertakes to pass over a given distance will likewise be zero; that is to say, a body will move in a vacuum in no time, which is absurd. A similar 'absurdity' is reached when we consider the other determinant in a moving body, namely, its weight. The weight of a body is its power to cut its way through a given medium, but inasmuch as a void is the absence of any medium, all bodies, whether light or heavy, would fall with the same velocity, and according to Aristotle this again is absurd. Consequently motion, in any of its forms, would be an utter impossibility in a vacuum.

Or consider the void in which a body is placed. When a body is immersed in any liquid, the latter will either be compressed or displaced and dispelled. But it is inconceivable how a void, sheer nothingness, can either be compressed or dispelled. Evidently then the void will absorb into itself the immersed body. Now every body possesses magnitude; and if the void is real, how will one

magnitude absorb another one without violating the law of impenetrability. Consequently Aristotle concludes a void does not exist. It should, however, be remarked that the argument is not altogether sound. The hypothetical reality of the void is not consistently maintained in this argument. In the first part Aristotle argues that the void, even if real, cannot be compressed or dispelled, because materially it is mere nothingness, yet in the latter part he argues that if the void be real it would absorb the immersed body and thus violate the law of impenetrability; but if its reality is not meant to be material, we have no case here of absorption, or any one *body* penetrating another.

How then does Aristotle explain the phenomenon of compression and condensation which is very often adduced as an argument in favour of the vacuum theory? And what constitutes the differences between a rare and a thick body? Is it not that the rare has many more intervening voids which become stuffed with matter when the given body is undergoing a process of condensation. No, according to Aristotle, the difference between a rare and a thick body is not that the one consists of segregated tinier particles than the other; in other words, the difference is not quantitative, but purely qualitative. Matter is never broken up or discrete, it is continuous and unique; but there are two states of matter, the rare and the thick. And these two qualitative states are not mutually exclusive, but each one harbours the potentiality of the other. Thus condensation and rarefaction really fall into Aristotle's conception of motion, inasmuch as they are both processes of realization of latent potentialities.

Let us now formulate briefly Aristotle's main thesis in the problem of space. The term 'space' conveys to us three

distinct ideas: either the magnitude of any given body, i. e. extension, or the receptacle of a given body, i. e. its place, or mere magnitude not filled with matter, i. e. a void. Now empirical space was not at all a problem for Aristotle. He combated the notion of space as the 'interval' (διάστημα) of a given thing, but the existence of the 'interval' he never called in question. The Cartesian breach between mind and body, which led to the famous Kantian doctrine of the subjectivity of space, was yet unknown. The reality of any concrete magnitude is not called in question. As to the notion of place, according to Aristotle, it is nothing else than the relation of contiguity subsisting between two bodies. It does not represent, then, any entity of its own, whether material or spiritual. It is a relation, it is the point of contact between two concrete objects. Finally, as to the void, this is entirely non-existent, for the reason that since place is simply the relation of proximity subsisting between two things, there is no room left for mere extension outside of any concrete object or void. Hence space is finite, as finite as the material universe of which it is an expression of contiguous relationship.

It should, however, be observed that Aristotle was not consistent in this notion of place. He argues that place is essentially stable and immovable, for if it were movable it would move in place, *ergo*, place would be in place, which is absurd. Hence, only the all-containing diurnal sphere immovable—though revolving around its own axis—can be designated as essential place; otherwise we have only accidental place. Now imagine I have a coin in my hand, and I move my hand from point *A* to point *B* on my desk. To be sure, the place of my hand, that is to say, the relation of proximity between my hand and the point *A* changes,

but the relation between the coin and my hand does not change. You may imagine also that while I move my hand from *A* to *B* the coin undergoes on its own account a simultaneous change of place-relation; but the two changes in place-relation are mutually independent, since point *A* is not the place of the coin. It is meaningless therefore to speak of space moving in space, if by the latter is meant merely a relation of contiguity. Thus Aristotle's distinction between accidental and essential place is unwarranted. Altogether one may speak of an object as being in motion, in the sense that the one and the same object preserving its whole identity changes its environment; but if by place we understand just this relation of environment it cannot strictly speaking move, for its whole identity is changed, and there is not one relation moving, but there are as many distinct relations as points of motion. It is the failure to realize this distinction between a relation and a thing, i.e. between place as relation and place as objective space, that makes the whole argument fallacious.

Thus I have presented before the reader two distinct views of space, the Platonic and the Aristotelian. The first, as I understand it, looks at the material universe as a small island in the midst of a vast infinite sea which we call space. The other takes no cognizance of imperceptible space, but apprehends only corporeal things and their relations. How far Jewish speculation was influenced by these two views, the subsequent pages will attempt to describe.

## CHAPTER I

## EMPIRICAL SPACE.

I. THAT extensity is an indispensable element in our notion of matter was never questioned by Jewish thinkers. Yet the complementary idea that unextendedness is an indispensable element in our notion of spirit was less fortunate. The line of demarcation between matter and spirit was not distinctly drawn by some earlier Jewish thinkers. Subconsciously, however, they felt that an absolute spirit cannot be conceived in terms of magnitude. Hence, while the soul is sometimes spoken of in words that do not exclude extensity, it is always emphasized that the deity is beyond the category of space. Gradually the two types of reality were mutually divorced, and the principle soon acquired axiomatic certainty that unextendedness is the distinguishing mark of spirit, just as extendedness is the distinguishing mark of matter. Let us see how this change came about.

Beginning with Saadya of Fayum,<sup>14</sup> an author of the earlier part of the tenth century, we find that he accords to the soul only an intermediate position between matter and spirit. It is made of a luminous stuff that is finer than matter, though differing only in degree.<sup>15</sup> Hence the

<sup>14</sup> Saadya may be designated as the author of the first systematic presentation of the philosophy of Judaism, though by no means the pioneer in Jewish mediaeval speculation. Mention is to be made of Isaac Israeli of Kairwan, a thinker of note, who died one year before the completion of the *Emunot*, but whose philosophical fame was eclipsed by his fame as a physician. Cf. *Iggerot ha-Rambam*, p. 28, Leipsic, 1859.

<sup>15</sup> See *Emunot*, ed. Kitover. I have selected this uncritical edition for reference because of its being the most accessible. (A scholarly edition of the *Emunot* is now being prepared by Dr. Malter.) See also Horowitz, *Die Psychologie bei den jüdischen Religions-Philosophen*, I, 28.

problem of space and spirit did not present itself to Saadya in connexion with the soul. Perhaps his treatment of the deity, though belonging to the realm of theology, will give us a better occasion to learn what he thought of our problem. We find that Saadya lays special emphasis on the non-spatiality of God. By extensity, he says,<sup>16</sup> we mean two things, first the tridimensionality of an object, and secondly divisibility. An indivisible extensity is a contradiction of terms, for by extensity we mean a simultaneous continuity of parts. Feel this book, you have a sense of parts outside and alongside of each other, and you say it is extended. Thus our notion of the magnitude of an object is composed of the sense of its tridimensionality, and that of the 'alongsidedness' of parts or divisibility. But God cannot be said to be either tridimensional or divisible, hence he is beyond extension. In another place<sup>17</sup> he argues that only the material can be said to occupy space, which according to his conception means to come in contact with another body. When we say that an object moves in space we mean that there is always a point of contact, a *limit* between the earth and the body which encompasses it, namely, air, but we cannot perceive how the immaterial can meet a material body. Hence God is not in space. Saadya, it is to be noticed, alludes here to the Aristotelian conception of space, i.e. as 'the inner limit of the containing body', as we shall see in the sequel; but the basic idea of the argument is that inasmuch as by 'limit' we understand that point where a certain body ends and another body begins, and that alongside of that point there is a series of points which do not mark the beginning of another body; in other words, since a limit conveys to our mind a picture

<sup>16</sup> *Ibid.*, p. 96.

<sup>17</sup> *Ibid.*, p. 99.



of a series, of a simultaneous succession of points, i.e. a picture of an *extended* object, the immaterial therefore cannot have any *limit*, for the spirit lacks the attribute of extension. Hence, when the prophets speak of 'God in heaven' they use metaphorical language, for surely they do not mean that God extends over, and is contained in the heaven.

But here we meet with a tremendous problem. How can we speak of divine omnipresence?<sup>18</sup> Omnipresence is the attribute of a thing which is here and there and everywhere, and that which has a 'here' and a 'there' has parts outside and alongside of each other, and is therefore extended, and to assume a divine omnipresence ought to be as nonsensical as to maintain a spiritual extensity or an extended spirituality. Saadya, however, is not ready to relinquish this fundamental dogma of religion. God, he explains, is present in the universe, as consciousness is in the body,

<sup>18</sup> See *Emunot*, p. 102. ואיך יעמוד בשכלנו המצאו בכל מקום עד שלא יהיה מקום ריק ממנו? מפני שלא סר קודם כל מקום ואלו היו המקומות מפרידים בין חלקיו לא היה בורא אותם וכיון שהדבר כן המצאו אחר שברא הגשמים כולם כהמצאו קודם לכן בלא שינוי ולא פרידה ולא הסתר ולא הפסק. By the expression לא סר קודם כל מקום, Saadya does not mean that God existed spatially before creation, for that would be a flat contradiction to p. 99, where he says ועוד שלא סר לבדו ואפס מקום ואינוננו, i.e. that God existed in no space before creation. There he also maintains that even after creation God must exist in no space, for else there would be a change in His being. Hence also the expression המצאו בכל מקום עד שלא יהיה מקום ריק ממנו cannot refer to any spatial existence. Evidently, then, Saadya means that while God is omnipresent, he is not at the same time extended; but he does not explain the apparent contradiction. An attempt at explanation he makes in the commentary on the Book of Creation, IV, 1, where he describes the deity as the consciousness of the universe, permeating the texture of the world by means of some rare and luminous gas. Comp. Kohler's *Grundriss einer systematischen Theologie des Judentums*, p. 73.

being found all in all and all in every part ; and just as the soul maintains its material nature and indivisible integrity while being diffused over the body, so is God in the universe. Cut a limb off from a living body, and the soul is not lessened ; annihilate a half of the universe, and the deity is not impaired. This explanation, however, can scarcely be designated a solution. It seeks to explain one difficulty by another difficulty, the difficulty of extended divinity by that of extended consciousness. Once you separate spirit from extension, you will find mind in space no more intelligible than God in space. Saadya, however, does not stand alone in the inability to cope with this tremendous problem. The human mind thinks in terms of the material data of human experience, it has no other data. Hence we are all labouring under a difficulty when we attempt not merely to *say* spirit but also to conceive spirit, whether mind or God. It is just as if the man born blind would attempt to conceive of colour. If, then, you accept the Cartesian dualistic position, you must end in sheer agnosticism of anything spiritual ; or else, leaving God to the theologian, you must maintain that the human mind is not an entity *per se*, hiding itself in some recesses of our grey and white stuff—for the very fact that you speak of it as located in a certain place spatializes it—but that it is a mere quality of our brain-stuff, just as heat is the quality of a certain body, meaning by quality a certain state generated by changes in the relative position of the atoms. Similarly consciousness is a certain state generated by changes in the relative position of the neural atoms under the action of external stimuli. Thus following the Cartesian dualism to its logical conclusion we eventually land in material monism. But that seems to me the only safe position if

we have no desire to entangle ourselves in the dilemma of space and spirit. But this is evidently too advanced for a mediaeval thinker, and I have permitted myself to digress in order to solicit our sympathy for Saadya and those who follow him in their vain attempt to solve a difficulty which still perplexes the human mind.

An advance in the conception of spirituality was made by Ibn Gabirol, who had the fortune of having his works quoted and discussed by the leading men of mediaeval scholasticism and his name forgotten.<sup>19</sup> He lays down a positive principle that anything simple and spiritual does not occupy space, and does not fall into the relation of near and far.<sup>20</sup> He goes beyond Saadya in considering the soul also an absolute *substantia simplex*, so that it is altogether beyond the category of space.<sup>21</sup> This uncompromising position opened before its author the wide chasm between mind and body. If the objective world is so essentially unlike the subjective world, what is it that transforms my impressions of external stimuli into a mental representation? And what is it that exchanges my purely mental act of volition into muscular activity? Gabirol attempts to bridge this chasm between soul and body. He finds in some sort of vital force (*spiritus*) a connecting link,

<sup>19</sup> *Orient. Lit.*, 1846, No. 46, and Munk's *Mélanges*, p. 152 ff.

<sup>20</sup> 'Omne simplex et spirituale locum non occupat.' *Fons Vitae*, p. 153. 'Substantia simplex non habet locum et omne quod non habet locum essentia eius aequè distat ab omni.' *Ibid.*, p. 156, on p. 120, he remarks: 'Substantia spiritualis non est terminabilis essentia quia non est quanta nec finita et quod fuerit terminabilis essentia eius essentia extenditur et est in omni loco'; but all he wishes to emphasize is, that of the spirit one cannot say it is here and not there. It has like relations in all spaces.

<sup>21</sup> 'Anima mobilis est per se non in loco,' p. 83. For the designation of the soul as *substantia simplex* see Horovitz's *Psychologie*, II, p. 108, note 65.

a 'causal nexus' between the two extreme forms of being.<sup>22</sup> The problem, however, still remains; what is it that unites this causal nexus to either mind and body?

After Gabirol, we find no Jewish philosopher questioning the non-spatial nature of the soul. The problem now was how to conceive of a non-spatial nature located in a certain place. God is referred to very often both by Biblical writers as well as by Talmudical sages as being in heaven. Similarly the soul has been located by Aristotle in the heart, and later by Galen in the brains. The opinion has also been ascribed to Plato that every man harbours in himself three souls, each one having its own habitation. But how can a purely spiritual being be in a certain place? When we say that the wine is in the flask, we mean that there is a limit where the wine ends and the flask or the walls of the flask begin. Strictly speaking, then, the

<sup>22</sup> See מקור חיים III, 3: הנפש נברלת לגוף ולולי הרוח האמצעי. Compare the *Tractatus de Anima* attributed by Munk to Gabirol, where we read: 'Simplex autem non potest coniungi spisso sine medio quod habet similitudinem cum extremis. Item anima non apprehendit sensibilia per se nisi mediante spiritu qui est substantia sentiens consimilis utrisque extremis et est media inter corporeitatem sensibillum et spiritualitatem animae rationalis.' The notion of *ruah* as distinct from *nefesh* was very popular in mediaeval Hebrew literature. See Steinschneider in *Hakarmel*, 1871, p. 400. See also *The Book of Definitions*, by Isaac Israeli, the physician, published by H. Hirschfeld in Steinschneider's *Festschrift*, p. 138: והנפש והרוח וואם ישאלנו שואל מה פרק בין הנפש והרוח נשיב להם כי הפרק ביניהם יהיה משתי פאות כי הרוח הוא עצם גשמי שמקיפו הגוף ואוחזו ומחזיק בו והנפש היא עצם רוחני שמקפת לגוף מחזין ומחזיק בו. Joseph ibn Akinin seems to have been conscious of these words of Israeli when he wrote: הרוח גשם והנפש אינה גשם אלא צורה הרוח. See his *Ethics*, p. 174 (*Sepher Mussar*, ed. Bacher, Berlin, 1910). Comp. also *Cosari*, p. 96: והנפש לא תתחבר כי אם ברוח חם טבעי אי אפשר לו בלתי מקור שיקשר לו כחקשר הלהב בראש הפתילה דמיון הפתילה היא הלהב.

'inness' of a thing implies a certain limit ; but a limit is always the end of a series of points that are not limits ; in other words, the end of a certain magnitude. But God and the soul are now conceived to be non-magnitudinal ; how can we designate them as *in* a certain place ? Surprisingly enough, the very author of the dualism of consciousness and extension, René Descartes, was guilty of the same fallacy. He located the soul in the pineal gland. We already saw Saadya finding difficulty in this idea. Judah Halevi explains it as follows: When we speak of God dwelling in heaven, we mean nothing else than that there the workings of the deity are most clearly and directly manifested ; for below the heavens it works through natural agencies, and thus the divine plan can be discerned only indirectly. This explanation, it should be noted, is based on the pre-Newtonian distinction between the *natural* sublunary world and the *divine* superlunary world. Later Jewish philosophers differed in explaining the expression of 'God in heaven', but they all agree that it is not to be taken literally.<sup>23</sup> A similar explanation Judah Halevi offers for designating the soul as being in the heart, because the latter is the most vital organ, the centre of all blood vessels and arteries, and here again we do not mean exactly that the soul is physically situated in the heart.<sup>24</sup> The possibility of any place-relation between soul and body was further reduced *ad absurdum* by a younger contemporary of Halevi, namely, Joseph ibn Zaddik. In his little work entitled *Microcosm*<sup>25</sup> he argues: The soul cannot be in the body, for anything that is in another object is

<sup>23</sup> See Schechter, *Aspects of Rabbinic Theology*, p. 28 *et seq.*

<sup>24</sup> See *Cosari*, ed. Zefrinowitch, Warsaw, 1911.

<sup>25</sup> See *Microcosm*, ed. Horovitz, pp. 33, 36.

corporeal. Moreover, if it were in the body it would either be centralized in one particular place, or else extended all over the body; but in the first case the other parts will be soulless and dead, and in the other case a limb cut off would be so much of the soul taken away, which contradicts our conception of the integrity and indivisibility of the soul. But perhaps it is outside of the body?<sup>26</sup> Then we would have three alternatives: either the soul is removed from the body, or close to the body on one side, or else enveloping the body like a veil. Now the first alternative is impossible, for how would the body live when not in contact with the soul. The second alternative is impossible, for then the other side not touched by the soul would be lifeless; and the third one is equally impossible, for if it embraces an extended body it must itself be extended. It must have a certain magnitude; a pin-point cannot embrace a material object. But the soul is pure spirit, and altogether unextended. Hence any conceivable place-relation between soul and body is absurd. And yet we speak of a soul animating the body; consequently there must be some inter-relation between them. How is that relation to be understood? The answer to this question Joseph ibn Zaddik puts in very vague and ambiguous terms.<sup>27</sup> He speaks of

<sup>26</sup> Such a view indeed has been maintained as early as Isaac Israeli of Kairwan in the above cited passage from *The Book of Definitions*: והנפש היא עצם רחני שמקפת לגוף מחוץ ומחזיק בו.

<sup>27</sup> והנה התבאר ממה שהקדמנו שאינה לא גוף p. 36, עולם קטן ולא בגוף ולא חוצה לגוף אלא היא דקה מאוד והקפתה לגוף יותר דק מהקפת הגוף עצמו ויותר קרובה לגוף מקורבת חלק הגוף לגוף. . . הואיל ואינה בו כמו שבארנו שאין מקומה הגוף אבל הנפש מקום לו אבל מקום ולא יעלה על הדעת שזה הדיבוק שאמרנו בנפש: Comp. p. 31. שכלי ההכמה ובנפש החיה שהוא דיבוק גשמי אבל הוא דיבוק רהני It is strange that the vegetative soul is here altogether omitted, although on p. 37

the soul being finer than the mere extremities of the body, and adhering to it closer than one part of that body adheres to another. But all this should be taken as a strong effort to describe the spiritual nature of the soul in the terms of matter. And he warns us not to conceive of the interaction between mind and body as in any way material. It is a spiritual interaction.

Undoubtedly the reader will still be dissatisfied. A spiritual mode of interaction will suit the spiritual agent, but not the material recipient. The 'causal nexus' that Gabirol and Halevi found in the vital force is no longer applicable here. According to Joseph ibn Zaddik, the vital force itself is absolute spirit beyond the category of space,<sup>28</sup>

he speaks of all the three souls as independent spiritual substances ; and on p. 29 he maintains that, strictly speaking, it is just as improper to locate the vegetative soul in the liver as the vital soul in the heart, for location would imply spatiality, and hence corporeality. This omission is not merely incidental ; it agrees with another passage on p. 28, where the reasons why the vital soul cannot unite with the body unless the latter has been already penetrated by the vegetative soul, is explained as follows : 'Body is dead, and the vital soul is the source of life ; the first is fine and the latter is thick and earthly. Hence the body can unite with the soul only when already filled with the vegetative soul.' But the question suggests itself quite readily : How does the vegetative soul unite with the dead and coarse body ? And if Ibn Zaddik meant to imply that the vegetative soul can come in contact with the body because it is near the material order of existence, how is it to be reconciled with the other statement that all three souls are spiritual and non-spatial ? The contradiction is patent, and all we can do in this connexion is just to point to it, but not to remove it.

<sup>28</sup> Ibn Zaddik does speak of a רוח החיה, a vital force, but in his psychological system it is only one of the constituent forces of the vital soul, and is therefore pure spirit. Comp. on p. 28 : ועל כן הנפש החיה היא נשואה : ברוח החיה שהיא כח מכתותיה והרוח הזה החי נשוא ברם הזך אשר בעורקים. The term נשואה, however, is difficult, suggesting as it does that the רוח החיה is something independent of the נפש חיה, which is expressly repudiated immediately by what follows. This vital force seems to

or any other material accessories. It is itself an extreme that needs a connecting link to come in touch with body. We welcome his elimination of the 'causal nexus' theory, which does not help the situation at all, and is fraught with logical difficulties, but on the other hand the doctrine of direct spiritual interaction leaves the problem still open on the side of the material recipient. However, occasionalism and parallelism, or any other doctrine invented for the purpose of justifying the dualistic standpoint, does not offer a more satisfactory explanation.

The dualistic position received its clearest formulation in the *Microcosm* of Joseph ibn Zaddik. It underwent no modification or further development in the systems of the Jewish philosophers that the Middle Ages produced after him. We are ready then to formulate our first thesis: Absolute spirit is distinguished from absolute matter in that it is altogether beyond all notions of spatiality. I say 'absolute spirit' and 'absolute matter', in order to include the first mediaeval thinkers, who though they entertained spatial notions regarding the soul, which was viewed as a somewhat material essence, yet removed all magnitudinal determinations from a truly spiritual essence, e.g. God. And if we consider that they lived in an age which was quite productive of queer mystic treatises on different ways of measurement of the deity and its various limbs, we will be in a position to realize the whole significance of the doctrine not only for the history of theology, but also for

be a superfluous appendix to his psychology, perhaps under the influence of Ibn Gabirol, though in his own system it is altogether meaningless. Comp. p. 28: הנפש החיה היא בלב נשואה בדם הנקי המתולעי אשר בלב, and on p. 29: שכחות הנפש החיה נשואים בדם אשר בלב, where this vital force is altogether omitted.



that of pure philosophic speculation. At first there was only the antithesis of God and corporeality, with mind occupying the middle ground, but the domain of spirit gradually appropriated all our psychic powers until the middle of the eleventh century, when strict dualism became the standard view-point in Jewish philosophy, a dualism of mind and body, the latter being extended in space and the former spaceless.

II. In the preceding discussion we have reached the conclusion that spatiality is the distinguishing characteristic of the corporeal world. Indeed, if you examine the different systems in Jewish philosophy you will find that they all concur in defining matter as that which has three dimensions. But this definition raises a very important problem, to which we will now direct our attention. Tridimensionality, we all agree, is the distinctive feature of matter, but does it constitute the very essence of matter? Evidently not: we can conceive of tridimensionality devoid of any material object. You may apply the air pump to your jar and thus remove the air almost completely, but you cannot remove the spatiality which still remains in the jar in spite of your efforts. Obviously the space does not constitute corporeality. And if we cannot say that a body is space, but that a body has space, the question remains what is body? What is it that hides itself behind a veil of tridimensionality?

Before we start our discussion of the Jewish view, however, let us attempt to examine the problem somewhat more closely, and get at the real issue. Pragmatically, it is to be noted, the whole question is meaningless. Reality consists of groups of sense-impressions which we call things, and with which we are constantly in relation and inter-

action ; as for things-in-themselves, we have as little to do with them as with the Man-in-the-moon. When the food is tasty we are satisfied, but whether the food *per se* is tasty or not, we never seem to worry. Or, to take a nobler illustration, we rejoice on a bright summer day over a vast green lawn, but we are little concerned with the possibility of there being something that is neither vast nor green nor lawn. The pragmatist then may very well shrug his shoulders at the quibbling whether extensity is only phenomenal or also noumenal. Yet from the standpoint of the historical investigator, who is anxious to trace the links in the development of human speculation, even this quibbling becomes highly interesting. The problem is as follows: Every object presents itself to our minds in a variety of ways. The apple is perceived in the form of greenness of colour, roundness of shape, smoothness of touch, and sweetness of taste. Now some of these forms of perception, like colour and touch and taste, are undoubtedly subjective. The apple in itself unperceived by the human mind is devoid of these secondary qualities. We all admire the beauty of the rainbow, but in fact this beautiful array of colours is a creation of our visual apparatus ; what we really have before us is a mere variety of absolutely colourless vibrations of ether. And now the question is: What of space? Is it also a sense-illusion, or is it real?

In the history of general philosophy we find that Aristotle understood his master to identify space with matter.<sup>29</sup> Whether it was a true understanding of Plato

<sup>29</sup> See *Phys.*, IV, 2 διὸ καὶ Πλάτων τὴν ὕλην καὶ τὴν χώραν ταὐτό φησιν εἶναι ἐν τῷ Τιμαίῳ . . . "Ὅμως τὸν τόπον καὶ τὴν χώραν τὸ αὐτὸ ἀπεφώνητο. See *Tim.* 52 a. Comp. Baeumker, *Das Problem der Materie in der griechischen Philosophie*, pp. 177 ff.

or a misunderstanding, I have attempted to decide in the introduction. But mediaeval thinkers after all followed Aristotle, and were consequently influenced by this ascribed Platonic notion. A similar theory was maintained by Descartes, who in his zeal to widen the gulf between mind and matter, made extension the essential nature of things, and was consequently led to deny the existence of a void, for a void is abstracted spatiality, immaterial extension, which is from the Cartesian standpoint an absurd contradiction. We may mentally abstract, he argued, all characteristics by means of which the external world makes itself known to our senses, but we cannot abstract the element of spatiality without destroying our cognition. We may conceive of a colourless, tasteless, and odourless object, but we cannot conceive it non-extended. Hence extension must be the essences of an object, the primary quality, unbegotten by the mind and independent of all perception. The avalanche is none the less big in far off arctic regions where there is no human eye to perceive its 'bigness'. Space is that attribute of things without which their existence is utterly impossible.<sup>30</sup>

The same argument that led Descartes to maintain the absolute and unconditioned reality of space, induced Kant to uphold the ideality of space. If I cannot abstract the space element without destroying my cognition it does not follow that space is an external reality, for that will not account for the impossibility of a mental abstraction of spatiality, but it does follow that space is the mental condition and the indispensable framework for all perception. Just as when we look through blue spectacles,

<sup>30</sup> See Descartes, *Principes*, I, 63-4 ; II, 11.

we see a world of blue, blue suns and mountains and trees, so the mind, when it turns its gaze on the external world, puts on spectacles of spatiality and thus beholds a strange extended universe. Consequently things-in-themselves, independently of our senses, are beyond the category of space; it is the mind only that envelops them in a garb of extension ere it admits them into its own domain.

Thus we have three solutions to the problem of space and matter, each solution marking a certain state of progress in the development of human thought. First, we have the pseudo-Platonic theory which maintains that space is the undifferentiated material substrate of all things, the raw material which the architect moulded into the infinite variety of things, the wax upon which the great Demiurgus impressed his signet. Secondly, we have the Cartesian solution, according to which space is not matter, and the very ground-work of all things, but the primary distinguishing attribute of corporeality, meaning by 'primary' the only quality which really adheres to an external object independently of human perception, and by 'distinguishing' the only quality without which the existence of corporeality is unimaginable. Finally, we have the Kantian solution, according to which space is neither matter nor an unconditional attribute of matter, but a subjective form of intuition, a framework of sensibility.

Now what solution did the Jewish thinkers offer to our problem? It should be noted that virtually all of them define matter as that which has three dimensions, some even make tridimensionality itself the definition of matter, yet one must be cautious in drawing from this, usually careless, definition any conclusion regarding the reality of space. However, some Jewish thinkers were more explicit

on that point. In his *Emunot we-Deot*<sup>31</sup> Saadya illustrates how one can rise from reflection on the empirical data of consciousness to the highest limit of human understanding, by first abstracting from any perceived body all the transient qualities like colour, heat, etc., then also abstracting the notions of extensity, and proceeding with this method of abstraction until the mind steps on the threshold of pure substantiality—Kant would have said the noumenon—which is beyond all human cognition. It is evident then that Saadya considers spatiality as something external to the essence of substantiality, as something that can be abstracted without destroying the concept, as something purely accidental. This view of space is strictly Aristotelian, in which system spatiality is one of the accidental categories of substance; and it is also shared by the Arabian school of thinkers going under the name of Brothers of Purity.<sup>32</sup> In Jewish circles it was by no means the predominant one, yet it found its adherents in Saadya, as already noted, in the staunch Aristotelian Moses Maimuni, and in a number of other thinkers. Maimonides especially maintained that spatiality does not constitute substantiality, that a substance consists primarily of matter and form, both of them indescribable in terms of extension which is only accidentally attached to them.<sup>33</sup> Similarly, Samuel ibn Tibbon holds that magnitude is an accident only, that substance is conceivable without it.<sup>34</sup> Indirectly,

<sup>31</sup> See *Emunot*, p. 84.

<sup>32</sup> Dieterici, *Naturanschauung*, p. 29: 'Der Raum ist eine von den Eigenschaften der Körper, er ist ein Accidens, das nur am Körper besteht und nur an ihm sich findet.'

<sup>33</sup> *Guide*, I, 76.

<sup>34</sup> Scheyer in *Das psychologische System des Maimonides* (Frankfurt a. Main, 1845, p. 110) thinks that Ibn Tibbon opposes Maimonides in this regard, and

from a pupil of the famous astronomer of the University of Padua, Elijah del Medigo, we learn that the latter held the same view.<sup>35</sup> Abrabanel<sup>36</sup> and R. Jehiel b. Samuel of Pisa,<sup>37</sup> both authors of the sixteenth century, also subscribe to that theory of space, according to which it does not play an essential rôle in our conception of pure matter. Thus, one view of the reality of space is the Aristotelian one. Extension does not enter our notion of corporeality, though no one assumed the existence of unextended matter. Snow is always white, yet whiteness is by no means the essence of snow; so matter is always extended, yet extensity is not the essence of matter. It is an inseparable accident.

Over against this view we have one that is more akin to the pseudo-Platonic conception. It was first voiced very emphatically by an older contemporary of Saadya, Isaac

he cites as proof the fact that the former defined matter as that which has three dimensions והם שלשה רחקים והם גדר הגשם הוא כל דבר שיש לו שלשה רחקים והם (רוח חן פ"א) אורך רוחב וגובה. But this definition, far from bearing witness to a substantialistic theory of space, might suggest the opposite, for it includes in the make-up of matter something that *has* tridimensionality and hence beyond it. This latter view is indeed explicitly maintained by Ibn Tibbon in the tenth chapter of the same work, where we read: ואין ספק כי הכמות הוא מקרה לעצם הנושא כי האורך והרוחב והגובה וכן האחרות והשניות והשלשיות אינם עצם הדבר ואין משלימים אמתת העצם ההיא אם כן היא דבר אחר מקרי לעצם. But this passage was altogether overlooked by Scheyer, and also by Schmiedel, who followed him blindly. (See his *Studien über Religionsphilosophie*, Wien, 1869, p. 277, n. 2.) It is also noteworthy that it is by no means certain that Samuel Ibn Tibbon is the author of the pamphlet entitled *Ruah Hen*. But the other theories are no less probable. At any rate it is the work, not the authorship, that is important in this connexion.

<sup>35</sup> See שאלות שאול הבהן, p. 10.

<sup>36</sup> *Ibid.*, p. 20.

<sup>37</sup> See *Minḥat Kenaot*, ed. Kaufmann (Berlin, 1898), p. 37.

Israeli, in his statement that 'tridimensionality is matter, and matter tridimensionality'.<sup>38</sup> Israeli seems to have held this doctrine, a truism, an axiom of thought which requires no proof. Later thinkers were somewhat less confident in this regard. Yet the conclusions of some of them at least were not substantially different. Gabirol considers all existence, both material and spiritual, essentially one. The divine intellect and the mute rock are, according to him, made up of the same matter; it is only the form, the differentiating principle in the universe, that made one mute and the other mental. The genesis of the Universe was then as follows: Originally there was the *hyle*. Then the *hyle* was divided in two, one part of which assumed the form of spirituality, and the other corporeality. Then each great division further divided itself, and again subdivided itself, giving rise to the infinite variety of things, each step in this great evolution being a form to that which preceded and matter to that which is to follow. If we take a flower, we may trace back the different stages that this flower stuff underwent on its march from the *hyle*. Let us consider the few more conspicuous stages.<sup>39</sup> Our first impression of the flower is the red colour, and we call it the quality-form. But redness has no existence *per se*. What is it that is red? You will say, of course, the flower is red. But the flower nature is present in each one of its minute particles, yet each minute particle is not red, just as each thin leaf of a gilt-edged book is not perceptibly gilt;

<sup>38</sup> See *Sefer Yesodot*, ed. Fried, Drohobycz, 1900, p. 47.

<sup>39</sup> Cf. *Fons Vitae*, p. 204: 'Et quo magis redierit et exierit a *substantia ad quantitatem* et a *quantitate ad figuram* et a *figura ad colorem*, manifestius fiet ei esse propter crassitudinem suam.' Notice the four stages in the genesis of all things: (1) substance, by which is meant the first matter; (2) quantity; (3) shape; (4) colour.

consequently a flower is red only by means of extensity, which stands in the same relation to colour as matter is to form. Now analyse further and inquire what is extensity, and what is it that sustains it. Gabirol's relativism prevents him from halting at extensity, though he identifies it with corporeality; and hence he maintains that extensity is the form which combines with the original undefined hylic matter. And even before subjecting itself to the categories of accident, the substance that the Greeks called *μεταξύ*,<sup>40</sup> i.e. the first compound of matter and form was already extended. Thus Gabirol's view on our problem is clear, though expressed in the very vague and disputed terms of matter and form. Extensity is not a phenomenon of corporeality like colour, sound, smell, but that of which they are phenomena, that is to say, corporeality itself.<sup>41</sup>

<sup>40</sup> Whether Aristotle assumed a *metaxu* was one of the issues in the Neumark-Husik controversy, for which see *Archiv für Geschichte der Philosophie*, XXIII, 4, 1910, and XXIV, 3, 1911. It is curious, however, that Isaac Abrabanel seems to have foreseen this controversy, and decided the case in favour of Husik, see *שאלות שאול הבהן*, p. 20. Yet one is no heretic if he doubts Abrabanel's authority for Aristotle.

<sup>41</sup> *Fons Vitae*, p. 229: 'Sed vides quod *materia corporalis*, i.e. *quantitas* quae sustinet formam coloris et figurae non est forma corpori quod eam sustinet sicut qualitas, i.e. color et figura est forma illi.' Cf. also Guttman's *Die Philosophie des Solomon Ibn Gabirol*, p. 180. On p. 293, Gabirol remarks: 'Oportet ut scias quod qualitas etsi adiacet quantitas, hoc non est nisi quantum ad sensum sed certe quantitas et qualitas simul sunt, ideo quod color et figura comitantur corpus universaliter.' Gabirol does not mean to imply that the essential nature of extension is a mere sense-illusion; but that though colour is accident and quantity substance, still both are equally necessary for the perfection of matter. The expression *comitantur corpus* is somewhat misleading, but its meaning becomes evident on comparing the Hebrew Text of Palquera which reads *אבל על האמתה הוא והכמות יחדיו* (כי הגון והתבנית מתחייבים לבלות) (i.e. to perfect) (מקור חיים, 24). Schmiadel (*l.c.*) here, again, overlooked all these passages and cites only the passage in *Meḳor Ḥayyim*, II, 2: (i.e. a body) *וכשתנדרור אותו תאמר שהוא*



Gabirol, it is true, posits in every corporeal object an unextended hylic element, and in this respect he dissents from the pseudo-Platonic view which considers space itself the hylic element; but the *hyle* as used by Plato denotes a greater reality—if the latter can at all be said to be greater or smaller—than the *hyle* of Aristotle and the mediaeval thinkers, so that the two views are at bottom one. For our discussion we may eliminate altogether the mysterious *hyle* which tends to confuse the whole argument, and thus formulate Gabirol's position as follows: Extendedness is the essence of a thing or the thinghood; all other notions we have of an object are unimportant accident. The mathematician, Abraham b. Hiyya, adopted a similar view, and defined matter as tridimensionality plus something, the first term being the form of corporeality, and the second the indeterminate *hyle*.<sup>42</sup>

The same attitude was taken by the author of the *Microcosm*, Joseph Ibn Zaddik.<sup>43</sup> Tridimensionality, he

הארץ והרחב והעמק, and tries to find the cause of the disagreement between Gabirol and Maimonides as to the reality of space in their different attitudes on a certain point in the problem of matter and form, but he misses the real problem at issue. Comp. also Scheyer's *Psychologisches System des Maimonides*, p. 110.

<sup>42</sup> See חובות הלבבות, p. 2.

<sup>43</sup> His meaning is at first glance not very clear and consistent. On p. 7 of the *Microcosm* Joseph Ibn Zaddik says: **למשך אשר ראשון** חומר הגשמות ונעשה עצם גשמי ולא השינו ממקרה הגשמות אלא שהוא ממלא מקום והראיה שכל חומר מאליו מובדל מן האחר הוא שכל אחד ממלא מקומו יחלף חבירו בקלות ובכידות ובקור ובחום. Thus he thinks that 'filling space' is an accident. Now turn to p. 9: **ובלבשו הצורה** הגשמית נעשה בגללו הגוף מורכב לפי שקבל היסוד האורך והרחב והעומק שאלה הם צורת הגשמות וכשדבקו בו הגבולים השלשה הנוכרים האלו מלא מקום ובהיותו ממלא מקום קבל שאר המקרים הגשמיים המושגים בהרגש. Here he holds that tridimensionality is the form of matter, while

asserts, is the form and essence of corporeality, which the *hyle* assumes in the process of actualization; yet impenetrability he maintains is a mere accident. An accident is an unessential element in the conception of a thing, and we can very well conceive of a substance as pure extensity without thinking of that property by virtue of which it resists any body attempting to take its place. In fact, geometrical bodies are not impenetrable; a thousand angles may occupy the same space. And this author evidently applies the conception of ideal matter to real matter. It is the geometrician who deals with the ultimate essence of things, all other scientists with mere accidents.

A slightly divergent view was maintained by Abraham Ibn Daud in his work entitled *The Exalted Faith*. This author points out that tridimensionality is not the essence of matter, but an accident. Quantity is one of the nine accidental categories. It is accidental because it is not permanent and immutable. From the same piece of wax—let us say ten cubic cm. in volume—you can mould any number of objects with an infinite variety of dimensions.

'filling space' is accident. Similarly, on p. 13, where he remarks: כי היסוד הנושא לארבע הטבעים האלו הוא עצם מחזיק מקום בלבוש צורת הגשמות שהוא האורך והרחב והעמק וכשימלא מקום יתנועע. When we examine, however, the meaning of the expression 'filling space' in the first quotation, we are led to suspect that it corresponds to the idea of impenetrability. This is corroborated by a study of this term as used by other authors. It is similar to the expression 'יטריד מקום' 'occupying space'—both corresponding to the Arabic *يطرد مكان*, sometimes used to convey the sense of impenetrability. Comp. Crescas, *Light of God*, p. 14: יטהר מקום בעלי חומר: יטרידו המקום אשר מזה הצד הוא נמנע הכנס גשם בגשם. Compare also the *Microcosm* itself, p. 15: דע כי ענין הגוף שהוא ממלא מקומו וכל זמן שמקומו מלא ממנו לא יתכן לגוף אחר להגיע לאותו מקום. The author's view then is clear. Extensity is the ultimate nature of matter; impenetrability is a mere accident.

You may say that though each one of these moulded objects has different dimensions, yet they all have the same amount of voluminousness, i.e. ten cubic cm. But melt this piece of wax and you get a different quantity altogether. Hence, when the geometrician comes to represent the ultimate essence of this piece of wax and draws a figure ten cubic cm. in volume, he is wrong, because the quantity changes, while our notion of substantiality implies an immutable and indestructible nature. But if the latter is not to be found in the specific amount of extensity, it is to be found in the *abstract* notion of extensity.<sup>44</sup> When a gas is condensed into a liquid, and that in turn into a solid, the quantity of extensity varies of course, yet they are all extended in the same degree. And the essence of matter is extensity. But does not the compressed liquid have less of extensity than the free gas? Yes, but extensity as the ultimate nature of things is not to be viewed quantitatively, but qualitatively. It is the quality of matter to be extended just as it is the quality of man to live. And from this standpoint a blade of grass and a vast landscape exhibit the same degree of the *quality* of spatiality. It is this indivisible spatiality which forms the essence of matter, and any question of more and less confuses the argument by introducing a foreign element, i.e. quantitative spatiality.

This view of Abraham Ibn Daud was adopted by the famous disciple of Maimonides, Joseph Ibn Aknin.<sup>45</sup> And

<sup>44</sup> See *Emunah Ramah*, I, 1, 2.

<sup>45</sup> See Moritz Lewin, *Drei Abhandlungen*, pp. 12, 13: שהגשם מליצה : מהרבקות אשר אפשר שיונחו בו שלשה שלוחים כריתותם על זויות נצבות ואחד השלוחים יקרא אורך והאחר רוחב והשלישי עמק ר"ל גובה וזה הוא ענין הגשמות הנמצא בהיולי ראשונה בלתי בחינת צורה אחרת ואינה נפש ר"ל כי השלשה שלוחים

(And here one codex has the following insertion :

it is strange that Don Isaac Abrabanel<sup>46</sup> ascribes this view to Ibn Akinin, and gives no credit to Ibn Daud. Interesting are the two objections that Abrabanel quotes to this profound view—objections that do not evince a full grasp of Ibn Daud's theory. One objection is attributed to Averroes, and may be stated as follows: Extensivity means continuity; and when a continuous object is broken up it loses its former continuity; hence extensivity is itself transient, and presupposes another immutable essence which we might term substance. But this objection evidently loses sight of the distinction between quantitative and qualitative space: when a body is broken up, its quantitative extensivity is lessened, but its qualitative extensivity remains unchanged. Strangely enough, even Ibn Akinin, who follows Ibn Daud in his view on space and matter, apparently attempts to reconcile this view with Averroes's objection, and explains it thus:<sup>47</sup> True that extensivity is the essence of matter, but it is only the formal essence; for

אינם עצמות הנגשם מאשר הם בפועל כי יקבלו השווי התוספת והחסרון והצורה העצמית לא תומר ולא תתחלף א"כ הצורה היא הרביקות לבר לא . . השלוח כי השלוח מקרה ממאמר הכמה יומר ויוסיף ויהסר בחומר האחר . . . הנה הצורה אינה השלוח אבל הרביקות אשר יונח בה (השלוח והנגשמים כולם משתתפים בצורת הרביקות)

כי הנה כת אחת מהם חשבו כי : 18, p. שאלות שאול הכהן.<sup>46</sup> הצורה הנשמות היא הרביקות ושהמרחקים הם מקרים בו ושמה היה אבו אל חנאג יוסף יחיאל הישראלי המערבי ונמשך אחריו אבו חמר ומפני זה נדר הנגשם שהוא שאפשר שיונחו בו שלשה שלוחים נחתכים על זווית נצבות.

ונבאר זה ונאמר שהנגשם מליצה מהרביקות והרביקות אינו מקבל הפירוד והמקבל הוא אשר יסאר עם הקבלה והרביקות לא יסאר עם קבלת הפירוד אבל הפירוד יעדר ממנו והוא בלתי מקבלו הנה המקבל דבר בלתי הרביקות ועליו ישוב הפירוד והרביקות בבא זה אחר זה

It is strange that Averroes is not mentioned.

since it is itself a variable, there must be an external hyllic essence behind it. But there are two fallacies in this argument. First, if extensity changes, it cannot be form which is coeternal with the *hyle*; secondly, extensity qualitatively considered is unchanging, and there is no difficulty at all. The second objection, anonymously quoted, also misses the real point. How can we conceive of extensity without the notion of dimensions? Of course it is conceivable, just as life is conceivable as a *quality* without the notion of the *quantity* of its duration. Space as a quality is simple and indivisible, and this is the ultimate nature of matter; space as a quantity is composed and divisible. It can be augmented and lessened, and is a pure accident of matter.

It is to be regretted that this novel and profound view of space did not find more adherents in Jewish philosophy. Perhaps it was too advanced for the period. It was one of those sparks of truth flashing before their time, soon forgotten in the surrounding darkness. After Aknin, the view of Gabirol, Abraham bar Hiyya and Joseph Ibn Zaddik was resumed in its original vague form. Moses Narboni,<sup>48</sup> Shem Tob b. Shem Tob,<sup>49</sup> Abraham Bibago,<sup>50</sup> Aaron of Nicomedia, the Karaite,<sup>51</sup> all teach that space is the ultimate

<sup>48</sup> *Ibid.*, p. 9 b: אמר החכם הנרבוני כי ירצה הצורה הגשמיות אשר היא המרחקים המשולחים הבלתי מוגבלים בעצמם והיא הצורה האחרונה אשר היא בלתי הווה ולא נפסדת. It is not clear what he meant by 'indeterminate space' as form of matter, Abrabanel (*ibid.*, 19 a) rightly objects that form is actual, and everything real and actual is spatially determinate. Perhaps Narboni also had in mind the pure and qualitative extensity of Ibn Daud.

<sup>49</sup> *Ibid.*, p. 10 b.

<sup>50</sup> *Ibid.*

<sup>51</sup> See his work called *Eṣ Hayyim*, ed. Delitzsch, Leipzig, 1841, p. 43: וידעת מה שיתבאר בס' המחקר כי הקו הוא אורך בלי רוחב ובלי עמק

form, the essence of corporeality. As no one of them added anything original to the conception, they may be dismissed without comment. The problem of space and the ultimate nature of matter did not cease to perplex the minds of thinkers, and as late as the sixteenth century we find a certain Rabbi Saul, a pupil of Elijah Delmedigo, still groping his way, unable to grasp how pure extensivity can be the material essence of all things, turns to Don Isaac Abrabanel to lead him out of the tangle. Abrabanel analyses the various views and finally decides: Space is only an accident of things, an unessential element in the conception of matter.

Thus, to sum up, there are two rival views in Jewish philosophy as to the problem of the relation that space bears to matter, the Aristotelian and the pseudo-Platonic. Some uphold the first theory and maintain that space is not an essential nature, that we might conceive an unextended book or table, indeed the whole world of matter, in a pin point. Others are shocked by this view. If there is any matter at all, it must be spatial. This is how the mind conceives of matter as distinguished from spirit. The one is a *res extensa*, the other a *res cogitans*. Thus while some of the adherents of the latter view, like Isaac Israeli of Kairwan and Aaron of Nicomedia the Karaite, go as far as

והשטח הוא הארך ורחב בלי עמק והגוף הוא אורך ורחב ועמק וא"כ על אלו הרחקים הוסכמה מלת גוף וכל העצמים בין היותם דומים בין היותם בלתי דומים ויהיו להם אלו הג' רחקים שהם ארך רחב ועמק שם גוף אמרו לכולם בהסכמה. Compare an earlier Karaite of the middle of the twelfth century, Judah Hadassi, who in his *Eshkol Hakofer*, ch. 65, defines matter as that which has length, width, depth, and *thickness*: כל דבר שיש לו ארך רחב ועמק ועובי הוא יקרא גוף בלשונך implying that tridimensionality needs yet another element, perhaps, hardness, in order to constitute matter. Aaron evidently disagrees.

imagining the world, stripped of its accidents, which are superfluous both logically and ontologically—the world in its essential and permanent nature, a network of fine lines like telegraph wires without the poles, the meshes corresponding to concrete objects; others do not take such a thoroughgoing geometrical view of reality, and assume the existence of some hylic nature filling the great vacuum, together constituting matter. This substantialistic view of space is further modified by Ibn Daud, who is followed by Ibn Aknin. Space is the essence of all things, not as quantity, for then it is a variable compound, and cannot be therefore ultimate reality, but the simple and indivisible quality to be extended, which is present in the same degree in the tiniest grain of sand and in the unmeasurable ocean.

III. In the preceding discussion the reader was undoubtedly impressed by the fact that while the pseudo-Platonic and the Aristotelian or Cartesian views found their representatives in Jewish philosophy, one seeks in vain for any traces of the Kantian doctrine on the subjectivity of space. This may be a source of disappointment or gratification, but it is not strange. The mediaeval thinkers were not yet so critical and distrustful with regard to their senses. Their theory of knowledge was absolute empiricism. Why should we doubt the existence of a thing which we may see and feel in various ways? Hence even those who upheld the view of the accidental nature of space, nevertheless agreed that it is a characteristic indispensable—at least in experience—of every material object. It was with them an axiom of unquestionable certainty that all existent things are extended.

But this leads us to another problem which played a very prominent rôle in the history of thought. Suppose

we take a material object and divide it and subdivide it, and carry on this process of subdivision *ad infinitum*. Of course the extensity of the thing will shrink and shrivel, but in this process of subdivision are we ever going to reach a piece of matter so infinitely small as to be altogether unextended? Our first thought answers: Yes, every process must have an end. But this would contradict our previous conclusion that matter must have magnitude, unless of course we assume that in this infinite process of division matter together with space is annihilated—a very improbable assumption, because it questions the law of indestructibility of matter, which no mediaeval thinker would dare. Briefly, the problem of infinite divisibility of space, and hence also of matter, presents itself for our attention.

The doctrine of infinite divisibility is as ancient as Aristotle, and together with all other views of this matter, it held sway over human minds in the Middle Ages. But the Mutakallimun, the Arabian theologians whose influence on mediaeval thought was not insignificant either, held a different view on this matter. They were atomists. Apparently it is strange that a system which was founded by Democritus, and developed by modern scientists with no other motive than the removal of an intelligence, working behind the veil of phenomena, was advocated also by theologians who sought to bring the theological element of nature to the foreground. But really those Arabian scholastics were not inconsistent in this regard. The Greek and the modern atomists considered the atoms ultimate realities unbegotten and indestructible, whereas according to the Mutakallimun atoms perish, and new atoms are born at every moment. Along with the atomism of space there



is an atomism of time. There is a continuous creation as well as a continuous destruction in the whole universe. An angel of death and an angel of life walk arm in arm in the infinite voids of space and time. There is nothing lasting two moments—is the favourite maxim of those thinkers. What then is it that abides in the midst of the universal and eternal change and decay? Nothing else than the Deity—answer the Mutakallimun triumphantly. Thus atomism is accorded a prominent place in the theological system of the Arabs.

I mentioned the atomic theory as disputing the field with the Aristotelian notion of infinite divisibility. The reader may not at first realize the dispute between the two theories. An explanatory word is necessary. Etymologically, 'atom' means indivisible. But the term 'indivisible' is ambiguous. The chemist seeks to know the elements that enter in the composition of a certain piece of matter and the proportion of their reaction, and when he gets at the unit of reaction, at that tiny being which is just big enough to unite with others and form this visible universe, he is satisfied. He has the atom; and indeed, chemically, it is no further reducible. The physicist, however, who is interested not only in its mode of reaction upon others but also in its own independent nature, finds that 'indivisible' is a misnomer. Minute as it may be, it has magnitude and part out of part, consequently it is a composite. Thus we see that the chemical notion of indivisibility does not conform to the physical notion. Now the Mutakallimun considered the atom indivisible in this last physical sense, while the Greek and the modern scientists use the chemical notion of indivisibility. The Moslem theologians think that matter is composed of

ultimate particles indivisible and altogether spaceless by themselves, forming space by their combination. We see now wherein Arabian atomism opposes the Aristotelian doctrine of infinite divisibility. It maintains that if you will carry on your process of division long enough, you will eventually reach an atom indivisible, and filling no space at all, a mathematical point.

Did Jewish philosophy endorse the atomistic doctrine of the Kalam? Our answer is in the negative. Altogether the Kalam was not a prevalent doctrine among the Jewish thinkers, though it found adherents in Karaitic circles;<sup>52</sup> but Arabian atomism, as distinguished from the Greek and modern type, was wholly rejected. Ibn Ezra<sup>53</sup> and Judah Hadassi the Karaite<sup>54</sup> accept the atomic theory; yet the latter thinker does not commit himself on the question whether the atom has magnitude, and the former states explicitly that the atom takes up space. In fact, Jewish philosophy is unanimous in opposition to this type of atomism, and in favour of the Aristotelian doctrine of infinite divisibility. Let us examine some of its arguments.

Already Isaac Israeli of Kairwan,<sup>55</sup> elder contemporary of Saadya, devotes considerable space to the atomistic doctrine of finite divisibility. He refers to Democritus whom he misunderstands. Democritus, according to Israeli, maintained that matter is composed of spaceless atoms,

<sup>52</sup> The Karaitic thinkers were generally inclined towards the Kalam. Indeed, they even assumed the name of Mutakallimun. See *Cosari*, VI, 5. The Rabbanites, however, were usually Aristotelians. Comp. *Guide*, ed. Munk, I, 339, note 1.

<sup>53</sup> See *Kerem Hemed*, IV, 2. On the authenticity of these fragments see Schreiner, *Der Kalam in der jüdischen Literatur*, p. 35.

<sup>54</sup> See *Eshkol Hakofer*, p. 65.

<sup>55</sup> See his *Book of Elements*, ed. Fried (Drohobycz, 1900), p. 43.

or points. But the union of two points can be conceived in two ways: either the totality of the one unites with the totality of the other, or a part of the one comes in touch with that of the other. Now the first case leaves no separation or distance between the two points, and hence the result of the synthesis would be a point, and the second case involves the contradiction of a partial union of atoms that are by hypothesis spaceless and devoid of parts. For by a spaceless object we understand something which has no opposite sides: that point which indicates its beginning also indicates its end. Consequently mathematical points can never produce an extended object.<sup>56</sup> The underlying idea of the second part of the syllogism, namely, that any object that has two sides, has part out of part, and is therefore spatial, recurs in the works of the second Israeli<sup>75</sup> and of Aaron of Nicomedia.<sup>58</sup>

Saadya also combats vigorously the conception of mathematical points as the ultimate unities of extension. An indivisible atom, finer than any fine thing conceivable, almost a spiritual essence, is altogether unintelligible.<sup>59</sup> But he also realizes the tremendous difficulty connected with the theory of infinite divisibility. If a body can be divided *ad infinitum*, it must be composed of infinite particles. Infinite means endless, that is, there is no end to the particles in any given distance, great or small. There is a difficulty already, namely, that of a given finite line being infinite, for a line is the sum of its particles. Let us, however, overlook this ontological objection and ask a simpler question. We constantly see before us things

<sup>56</sup> This ingenious argument is drawn from Aristotle's *Physics*, VI, 1.

<sup>57</sup> *Yesod Olam*, I, 23.

<sup>58</sup> *Eṣ Ḥayyim*, p. 7.

<sup>59</sup> *Emunot*, p. 63.

moving, but how is motion possible? Imagine a given line  $AB$  having infinite particles, and a point  $P$  moving from  $A$  to  $B$ . Now it is absolutely immaterial

$$A \overset{P}{\text{-----}} B$$

whether  $AB$  represents a mile or a yard or a fraction of an inch, it is infinitely divisible, and has infinite parts. And the point  $P$  must move over one part after another, one after another; and in order to land at  $B$ , it must have completed an infinite track, and reached the end of an endless series, which is impossible and absurd. It can also be shown that  $P$  cannot even commence to move, for the tiniest bit of the line is infinitely divisible, and  $P$  finds before itself an immeasurable abyss in order to reach the very next point. All of which goes to prove that motion is a mere illusion, or else the theory of infinite divisibility is false.<sup>60</sup>

The reader will have recognized the paradox of Zeno of Elea. The difficulty is truly tremendous to-day no less than twenty-five centuries ago. Saadya states that this objection led some thinkers to reject the theory of infinite divisibility—which means to face other difficulties; others—to assume that the moving point hastens some part of the way in order to make up for the infinite—which is the view of the Najimites; and, as Schahrastani remarks, hasty or slow, it must go through an infinite;<sup>61</sup> still others—to maintain that time is also infinitely divisible, each infinitesimal space corresponding to an infinitesimal time, and altogether  $P$  moving over a finite space in a finite time—an explanation which only intertwines one difficulty with another. Saadya's own explanation is as follows. The

<sup>60</sup> *Ibid.*, p. 59.

<sup>61</sup> See Schahrastani (Haarbrücker), I, 56.

theory of infinite divisibility claims by no means that there is actually unlimited division. The fact is that if we continue to break up a given particle long enough, we eventually reach a *minimum sensible*, and there our process of division must end. By means of magnifying glasses and exceedingly fine instruments this *minimum sensible* becomes a composite, and is further divisible; the limit of division is pushed a little further, but a limit there is after all. Thus there is no such thing as infinite divisibility as far as actual experience is concerned. All that is claimed is, that the *mind* conceives no limit to the possibility of dividing a given body, for this reason: that small as an object may appear to our senses, we may conceive of a microscope that magnifies the object a hundred-fold, and when the *minimum sensible* is reached under this lens we may exchange it for another that has the power to magnify the object a thousandfold, and number is infinite. Consequently we can *mentally* divide an object *ad infinitum*; but only mentally, in reality we sooner or later get an ultimate empirically irreducible unit, a *minima pars*. Hence the possibility of motion which is a phenomenon of reality.<sup>62</sup>

The explanation is by no means clear and cogent. Chiefly there is this difficulty. We may fail to dissect an object experimentally into an infinite number of parts, but if our reason for maintaining the theory of infinite divisibility is valid—and Saadya claims that it is valid within its sphere—there are in that object an infinite number of points which, though empirically unknown, the moving body must pass over successively until the end of the endless series is reached, which is absurd. Thus Zeno's paradoxical ban on motion on the basis of the assumption

<sup>62</sup> See *Emunot*, p. 59, and compare *Cosari*, p. 183.

of infinite divisibility is scarcely removed. Saadya's view might suggest the existence of two kinds of space—one perceptual and real, the other conceptual and ideal; the former of a discrete nature, the latter continuous and infinitely divisible, so that both our perception and our reason are unerring within their distinct spheres; but it is highly improbable that Saadya would have taken such a dualistic standpoint. Briefly, then, Saadya introduced Zeno's paradox in Jewish philosophy, but could not explain it himself. This was left for a later thinker.

A strong plea for infinite divisibility is found in the second book of Gabirol's *Fons Vitae*. Extensivity and indivisibility, he argues, are altogether two different kinds of being, the one is matter and the other spirit; and it is impossible to reduce one kind of being into an essentially different one. Hence the impossibility of matter being composed of indivisible and spaceless atoms, or, as Gabirol calls them, *minimae partes*.<sup>63</sup> It is not denied that there is a *minima pars* as far as our perception is concerned.<sup>64</sup> There is a *terminus a quo* to human vision. We cannot see very well a magnitude smaller than a hair's breadth. But the visual *limen* is not one for all men. It is relative only; a very keen eye may see things entirely hidden from the normal sight. Our perceptual *limen* does not at all empty

<sup>63</sup> *Fons Vitae*, p. 57: 'Impossible est invenire partem quae non dividitur, eo quod omnes longitudines corporis sunt divisibiles usque in infinitum et necesse fuit omnes longitudines corporis esse divisibiles usque infinitum ideo quod impossibile est aliquid resolveri in non genus suum si enim proposita pars quantitatis resolveretur in partem quae non dividebatur, necesse esset quod pars illa aut non esset aut esset substantia simplex.' Comp. Israeli's *Book of Elements*, pp. 43, 47 ff.

<sup>64</sup> 'Non est impossibile hanc partem esse minimam partium quantum ad sensum non in se.' *Ibid.*, p. 56.

the ontological existence of a *minima pars*. If mathematical points were the ultimate constituents of matter, the whole world would be no greater than a mathematical point.<sup>65</sup> For the whole has no other qualities than those of its parts, the qualities of which may be magnified quantitatively, as ten burners will have a greater heat capacity than one, but the synthesis does not create any new qualities. If, then, the constituent elements do not possess the quality of extension, how can their aggregate be extended? And if the aggregate is not extended either, then we would have a case of a whole being equal to its part, contrary to the well-known law that the whole is greater than its part.<sup>66</sup> This latter contention is not very convincing. A part may be taken in the physical-spatial sense like an inch in a yard of extensity, or in the spiritual-spaceless sense like the will in consciousness. Obviously we may say that volition is a part of our conscious life without being forced to say that our consciousness must be quantitatively greater than our volition. As soon as we ascend to the domain of spirit we must leave the whole category of magnitude behind. Now, adhering to Gabirol's own standpoint that an indivisible unit must be of a spiritual nature, we are not subjected, with regard to the aggregate of such units, to the physical law that the whole must be greater than its part. Gabirol's

<sup>65</sup> *Fons Vitae*, p. 52: 'Similiter etiam si posuerimus punctum esse partem corporis et corpus est compositum ex suis partibus, hoc est punctis quod tibi videtur; necesse est ut totalitas corporis non sit divisibilis quoniam partes eius indivisibiles sunt.'

<sup>66</sup> *Ibid.*, p. 57: 'Si duae partes coniunctae non fuerint pars divisibilis, ipsae duae tunc et pars una erunt aequales erunt ergo duo aequalia uni quod est inconveniens, similiter etiam dicendum de tertia et quarta parte, usque in infinitum. Sed si compositum ex omnibus fuerit pars una non divisibilis, hoc est, si plures partes sint aequales uni parti: ergo corpus totius mundi erit aequale uni suarum partium quae est indivisibilis.'

first contention, however, that if the atoms are conceived to lack the quality of extension, they cannot form in their aggregate any extended matter, for the synthesis does not give rise to any new qualities, is perfectly valid.

An equally strong defence for the theory of infinite divisibility was made by Maimonides in his *Guide*. He clings to the Aristotelian theory that a moving object must be divisible,<sup>67</sup> that an indivisible object must be immovable and hence immaterial. He shows the absurdity of the view that there is an atom which does not fill itself any definite place, and yet somehow or other keeps an atom of space occupied. The reader of general history of philosophy will here recall the Monads of Leibniz. Indeed, Munk has already called attention to a striking parallel to this view of the Mutakallimun, found in Leibniz's *Epistolae ad P. des Bosses*, where he remarks: 'Substantia nempe simplex etsi non habeat in se extensionem habet tamen positionem, quae est fundamentum extensionis.' Also one of the later Jewish thinkers, Joseph Albo, defines the point

<sup>67</sup> See Aristotle's *Physics*, VI, 7. He derives this idea that a movable object must be divisible from the conception of change of which locomotion is one type. Maimonides' formulation of the whole doctrine is as follows: כל משתנה מתחלק ולזה כל מתנועע מתחלק והוא גשם בהכרח וכל מה שלא יתחלק לא יתנועע ולזה אי אפשר שיהיה גשם כלל (see *Guide*, II, prop. 7). I did not connect, however, the idea that motion implies divisibility with the similar idea of change, for the reason that the latter was very much disputed both in Arabian as well as in Jewish circles. Some forms of change are apparently sudden and involve no divisibility. Personally, I think that the theory that a movable object must be divisible, is not dependent on the notion of change. It can be inferred from the *Physics*, VI, ch. 1, where it is argued that motion implies a front and a back side of the moving body, and anything that has two extremities is extended and divisible. This, indeed, is the way that Aaron of Nicomedia formulates it: שכל מתנועע יקבל החילוק יקבל קרימה ואחור ובהכרח יקבל החילוק. See *Eṣ Ḥayyim*, p. 7.



as beyond the category of space, but having position.<sup>68</sup> But how can a thing exist in the physical universe, not in a space garb? And how does a mathematical point monopolize a definite space when it is itself in no need of it? 'Such things', Maimonides therefore concludes, 'are only said; they exist only in words, not in thought, much less in reality.'<sup>69</sup> Another objection to the Mutakallimun's standpoint is how could we bisect a line composed of an odd number of atoms.<sup>70</sup> One might say that, since the atom has no magnitude, it is really of no consequence for an exact spatial division; but strangely enough, according to the Arabian thinkers, it has a magnitudinal value in conjunction; hence that side which will own this middle atom will be more extended than the other. Consequently an exact division in this case is impossible. This last argument was also advanced by Maimonides' imitator, Aaron of Nicomedia, the Karaite, in his work called *The Tree of Life*.<sup>71</sup>

Finally, the problem of infinite divisibility received a new treatment in the work entitled *The Wars of God*, by the acute thinker Levi b. Gerson, or Gersonides. He reiterates the idea that a thousand mathematical points could not produce anything more than a point.<sup>72</sup> He points out that matter has a property called continuity (*hitdabbeḥut*), by virtue of which it may be divided and subdivided *ad infinitum*, and the most infinitesimal parts

<sup>68</sup> *Dogmas*, p. 124. Compare, however, Isaac Israeli in his *Yesod Olam*, I, ch. 2, p. 3.

<sup>69</sup> See *Guide*, I, 51. This view of the Kalam is also stated in the Karaitic work, *The Tree of Life*, p. 13, comp. *FV*, 65.

<sup>70</sup> *Guide*, I, ch. 73, third premise.

<sup>71</sup> See p. 7.

<sup>72</sup> *Milḥamot*, Leipzig, 1866, p. 345.

will still be extended and again continuous,<sup>73</sup> a view that coincides with the Kantian. But his most original contribution to the problem of infinite divisibility is his solution of Zeno's puzzle, thereby changing the whole meaning of the concept. We have seen how Saadya grappled with that puzzle and scarcely overcame it; we are now to see how Gersonides, four hundred years after, finally solved it—a solution well worth serious consideration on the part of present-day thinkers. Perhaps we had better let him talk for himself. He has just proved that the very notion of quantity in any of its forms, temporal or spatial, implies finitude and limitations, and he remarks: <sup>74</sup> ' Perhaps some one will question the argument just advanced, saying that there is one phase of quantity suggestive of the infinite, namely, the fact that number is infinitely augmentable and quantity is infinitely divisible; and it is also clear that quantity as such is infinitely augmentable, for it is not impossible that quantity as such should be greater than the universe. True, there is something that prevents the possibility of having matter larger than the universe, namely, the fact that there is no space beyond the universe, as the *Philosopher* (i.e. Aristotle) has shown; but it is not impossible for matter as such. . . . Our answer is that it is evident after a little thought that this objection is unable to overthrow our premise which we have laid down before, namely, that quantity as such is of necessity finite, for the nature of quantity necessitates finitude, as already explained. *But the endlessness that we find as characteristic of number and extensity is not endlessness in quantity, but endlessness in the process of division and augmentation.* That is to say, much as you divide it, the

<sup>73</sup> *Ibid.*, p. 333, also p. 346.

<sup>74</sup> *Ibid.*, pp. 333-4.

capacity will still be left for further subdivision ; and much as you augment it, the capacity will still be left of further augmentation. Yet divide and augment as you may, you will always have quantitative finitude, for number does not have such power as to change into non-number (i.e. infinite), but it does have the power to change into greater numbers. Thus it can never turn into an infinite, for it has been already explained that number is finite. The same is true of extensity. . . . And from this explanation it will become clear that extensity has no infinite number of parts whether potentially or actually, for if it had an infinite number of parts potentially or actually, a great absurdity would follow, namely, that a given finite extensity would be infinite, for that which is composed of an infinite number of parts must be infinite in extensity, for any one of these potential parts has of necessity some quantity, for extensity cannot be divided into non-extensity ; and it is evident that, however minute the extensity each one of the infinite parts may have, the whole will certainly be infinite in extensity. . . . Hence what we mean by saying that extensity is infinitely divisible is that each part retains the possibility of being subdivided, though the number of parts always remains finite.'

This whole discussion involves Gersonides' great contribution to the notion of the infinite divisibility—which will be discussed in a later chapter. The keynote of the argument however is clear, namely, that infinite divisibility is not a state but a process, not an accomplished fact ; for it is ridiculous to speak of an ended endless series, but the unlimited possibility of dividing and subdividing extensity into smaller extensities. And if one were to live thousands of years and were constantly engaged in dividing

and crumbling a piece of matter, with unimaginably fine instruments, he would have at the end of that time an unthinkably great number of particles of course, but it would be a finite number nevertheless. Prolong the life of that miserable man, and the world would be enriched by so many more particles, but the sum total will be finite again. The number of grains of sand on the shore of the sea is overwhelming ; but it is a definite and finite number. It is absurd and contradictory to speak of an existing infinite number. Infinite divisibility denotes a process, but not a state. Such is the solution of Gersonides. It rids us at once of the haunting ghost of Zeno which continued to appear as soon as we had infinite divisibility on our lips. Gersonides showed us how to make of it an intelligible theory.

We are now ready to draw a line under the first general inquiry of our work. The problems that so far occupied our attention are connected with the conception of empirical space, i.e. with that part of space which has embodied itself in concrete tangible matter, and has become therefore an object of experience. We have seen how the Jewish thinkers never doubted the independent objective reality of space as presented to their senses. They differed as to its ontological importance in the make-up of things, they took issues as to its accidental or substantial nature, but no one questioned its independent existence. Thus the Kantian view of the subjectivity of space, which puts all extensity at the mercy of our senses, is far removed from the Jewish standpoint. Some thinkers, we have seen, even go to the extreme in maintaining that space is the sum and substance of all material existence, the substantial groundwork of all things. Perhaps this distinctly empirical standpoint is

somewhat responsible for the general Jewish opposition to Arabian atomism with its assumption of a real yet spaceless particle as the basis of the material world. At any rate, Jewish thinkers all upheld the indestructibility of extension by means of division, that space is infinitely divisible—a theory the tremendous difficulties of which were altogether removed by Gersonides, who showed that the notion of infinite divisibility denotes a process rather than a state.

*(To be continued.)*